

# Plumbing Material and Pipes

## INTRODUCTION

Plumbing sector in India has witnessed a lot of development in the recent years. It has improved not only in terms of availability of better quality material, but also better technologies and processes which make the job role of a plumber even more interesting. Various types of new material and fittings have replaced traditional material, for example, plastic material has replaced Galvanized Iron material. The benefits include easy installation, easy-to-use material and cost-effectiveness. In this Unit, we will study about the different types of pipes and pipe material which are widely used by plumbers today.

## SEALING MATERIAL (THREAD SEAL TAPE)

Thread Seal Tape or faucet is used for sealing pipe threads. It is manufactured from a poly tetra fluoro ethylene (PTFE) film. This tape is cut to the desired width and placed around the threads of a pipe, prior to fixing it in place (Fig. 3.1).



Fig. 3.1: Thread seal tape



Fig. 3.2: Plumber's putty

## PLUMBER'S PUTTY

The putty is used as a sealant during plumbing (Fig. 3.2). It is a simple material needed for watertight seal around taps (also called faucets) and drains. The putty is one of the important components of a plumber's bag.



Fig. 3.3: Sealing adhesive

## SEALING ADHESIVES

These are used while joining plastic parts, fixtures, fittings, etc., and are mostly available in sanitary and hardware shops. These adhesives are made of chemicals. They can be used easily for an effective sealing. It is applied locally with a brush. After application, plumbing fitting should be fixed immediately so as to ensure a good grip (Fig. 3.3).

## PLUMBING PIPES

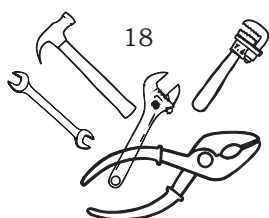
As you are aware, pipes are used for different purposes like transporting water for drinking, irrigation purpose, disposing the waste water, etc.

Plumbing pipes are manufactured in various sizes, mostly in a round shape. These pipes are made of various types of material as mentioned below.

### Types of plumbing pipes

Commonly used pipes for plumbing system are listed below.

1. Cast Iron (CI) pipes
2. Ductile iron pipes
3. Steel pipes
4. Galvanized Iron (GI) pipes
5. Copper pipes
6. Asbestos Cement (AC) pipes
7. Concrete pipes
8. Stone ware pipes
9. PVC pipes



## Cast Iron pipes (CI pipes)

These are mostly used as pressure pipes for transmission of water, gas and sewage and as water drainage pipes (Fig. 3.4). CI pipes have the following advantages—

- (a) They are cheaper in cost.
- (b) They have more resistance to rust and corrosion.
- (c) They are highly durable.

CI pipes are uniform in thickness. Special care needs to be taken during carrying and shifting, and joining of CI pipes, to prevent damage.

### Precautions

- (i) The socket spigot ends must be dry.
- (ii) Always caulk or seal the joint as soon as it solidifies.

## Ductile Iron pipes

These pipes are used for transmission and distribution of potable water.

They are made of ductile iron and are an improved version of Cast Iron pipes (Fig. 3.5).

## Steel pipes

These are popular due to their strength and light weight, as compared to CI pipes. Adequate preventive measures are required so as to save these pipes from adverse atmospheric conditions (Fig. 3.6).

Use of steel pipes in the water supply system is recommended when pipes are to bear more pressure (i.e., above 7 kg/cm<sup>2</sup>) and when the diameter needs to be large.

## Galvanized Iron (GI) pipes

These pipes are mostly used inside the building for water supply work. A zinc coating is made on wrought steel pipes. These pipes are manufactured in light, medium and heavy grade category, as per the thickness of the metal. For a 15 mm diameter GI pipe, the pipe thickness is kept as 2.0 mm, 2.65 mm and 3.25 mm respectively for the light, medium and heavy category. Mostly, the



Fig. 3.4: Cast iron pipes



Fig. 3.5: Ductile iron pipes



Fig. 3.6: Steel pipes



Fig. 3.7: Galvanized iron pipes

medium grade type pipes are preferred for internal plumbing work in a building. Screw and socket joints are mostly applied in GI pipes (Fig. 3.7).

#### Precautions

- (i) Ensure that burrs around the pipes are removed before threading.
- (ii) Use oil or lubrication during threading.
- (iii) Rotate the die stock clockwise and anticlockwise while cutting threads on the pipe, so as to remove chips from the die.
- (iv) The threaded portion should not be cut with a pipe cutter; always use a hacksaw for this work.



Fig. 3.8: Copper pipes

#### Copper pipes

These are mostly used for hot water installation requirements. They have high tensile strength. These are made from thin copper sheet and can be folded easily. Chromium is coated on copper pipes for better appearance (Fig. 3.8).

#### Asbestos Cement (AC) pipes

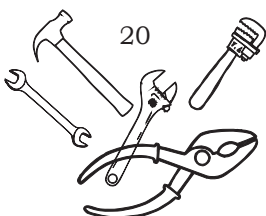
For removal of water (from the roofs), soil and waste, and for purifying the air, asbestos cement pipes (Fig. 3.9) are used. Two types of AC pipes are made—one with a beading around the socket (With Beading), and the other without beading around socket (Without Beading). The Without Beading around socket (WOB) type is mostly preferred over the one with beading. These pipes are available in the range of three metres of length. They are heavy and can break easily. The cost of these pipes is less than the PVC pipes. Nowadays, AC pipes are being replaced by PVC pipes.



Fig. 3.9: Asbestos Cement (AC) pipes with beading

#### Concrete pipes

As the name suggests, concrete pipes are made of plain concrete (mixture of broken stone or gravel, sand, cement and water), which is considered to be one of the strongest and most durable building material. Concrete pipes also come in different categories like unreinforced pipes, reinforced pipes and pre-stressed pipes. While the



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unreinforced pipes are made of only concrete, reinforced pipes contain iron mesh in addition to concrete, and pre-stressed pipes have iron rings at different intervals without any mesh.

Small diameters of unreinforced pipes, reinforced and pre-stressed pipes of large diameters, are manufactured for various uses as well as for water supply. Small unreinforced concrete pipes are mostly used for removal of water. For water supply works, pipes with bigger diameters are used (Fig. 3.10).



Fig. 3.10: Concrete pipes

### Stone Ware (SW) pipes

These are made of clay, and are primarily used in sewerage system for underground drainage, industrial drainage, irrigation, chemical industry for transporting the highly corrosive chemical, etc. Stone Ware (SW) pipes are mostly used to carry night soil and effluent water. These pipes are laid below the surface. The pipes should be laid on regular surfaces as they are rigid in nature (Fig. 3.11).



Fig. 3.11: Stone ware pipes

### PVC (Polyvinyl Chloride) pipes

These pipes are mostly used for carrying water in the plumbing system and are light in weight, non-corrosive, cheaper in cost and need not require any threading for joining connections. It makes them easily acceptable in the market (Fig. 3.12).



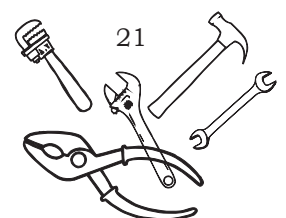
Fig. 3.12: PVC pipes

### Chlorinated PVC (CPVC) pipes

These pipes can be used for higher temperatures up to 120°C, and are therefore suitable for supplying hot water and are mostly used in industrial liquid application.

#### Precautions

- (i) The water supply and waste disposal pipes should not be laid very close to each other.
- (ii) Ensure that there is no back flow of water through the pipes towards the source of water supply.
- (iii) Avoid any cross connection between the water supply pipes and waste carrying pipes.
- (iv) Pipe joints should be properly tightened in the pipeline for getting maximum water pressure.



- (v) During installation of pipelines and waste water pipes, proper slope should be given.
- (vi) For developing an underground pipeline, good quality of GI pipes, i.e., Class C pipes should be used.

### ***Polypropylene pipes***

These are manufactured with polypropylene 'random copolymer'. Polypropylene pipes are primarily used for carrying hot water and cold water supply conduits, industrial pipelines, etc. (Fig. 3.13).



Fig. 3.13: Polypropylene pipes

- (a) Unplasticised PVC (UPVC) or rigid pipes are used for cold water.
- (b) Plasticised PVC pipes are made with mixing of rubber material. It has low strength and can work in low heat conditions than UPVC pipes.

### ***PEX or XLPE***

This type of pipe is made of specialised polyethylene and is used in building services, pipework system, domestic water piping, transportation of sewage, slurries and chemical transportation as well as for natural gas and offshore oil applications.



Fig. 3.14: PEX or XLPE pipe

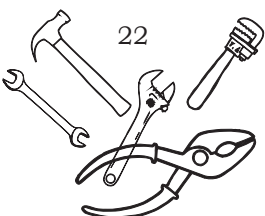
In water discharge system pipes, the thickness of the soil and waste discharge pipes should be larger than the pipes used for roof drainage. Mostly, hard PVC pipes are always used for supply of water with temperature less than 45°C. At a higher temperature, the strength of the pipes reduces. The strength of PVC pipes reduces due to ultraviolet radiations from the sun as well as changes in atmospheric temperature. PEX or XLPE pipes are costlier than AC pipes and cheaper than GI pipes (Fig. 3.14).

### ***Unplasticised Polyvinyl pipes***

These are primarily used in ventilation pipework, rainwater applications and waste water discharge system (Fig. 3.15). High Density Polyethylene (HDPE) material is used for making pipes for municipal and industrial water discharge systems. Polyethylene density is classified into three types:



Fig. 3.15: Unplasticised Polyvinyl (UPVC) pipes



- Low Density Polyethylene raw material (LDPE)
- Medium Density Polyethylene raw materials (MDPE)
- High Density Polyethylene raw materials (HDPE)

The properties of HDPE pipes are—

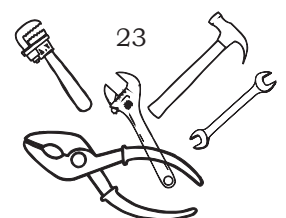
- (a) They are resistant to weather conditions.
- (b) They have high resistance to tearing and pressure conditions.
- (c) They are non-toxic in nature.
- (d) They are suitable for carrying radioactive wastes.

## PIPE LAYING

It is an important process in plumbing. The steps involved in laying of pipes are:

1. before installation of a new pipeline in the building, a layout plan of water distribution of the pipes from the storage water tank is prepared.
2. line of alignment of the pipes are maintained properly.
3. chalk marking or powdered marking is done with the help of a thread or rope, on the proposed area of wall.
4. pipes are fixed horizontally or vertically as required from the source of main water.
5. threading in the pipelines is carefully done so that joints are well settled and leakage is prevented.
6. jute and white paste are properly applied over the threaded portion to prevent leakage and for having watertight joints.
7. efforts are made to keep the number of joints on the pipeline as minimum as possible.
8. the size of the pipes is selected according to the length of the service pipeline, minimum pressure of water in the distribution main, type of plumbing fixtures, i.e., elbows, bends unions, T-joints used in the building, rate of flow and highest point of delivery above the distribution main.

## NOTES



## Care during work

1. Pipes should be cut to the required length.
2. The cotton thread should be wrapped on threaded portion of the pipe.
3. The packing material should be wrapped around the joint.
4. The pipe should be properly aligned.
5. Zinc oxide should be applied gently.

## Practical Exercises

### Activity 1

Identify the sealing material in a shop.

#### Material Required

1. Adhesive
2. Putty
3. Thread seal tape

#### Procedure

1. Collect the plumbing material from a shop.
2. Read the content written on the packing.
3. Identify the purpose of this material.

### Activity 2

Identify the plumbing pipes in a shop.

#### Material Required

1. Different type of pipes

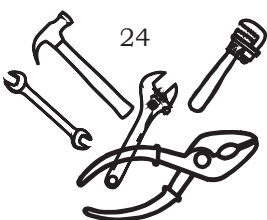
#### Procedure

1. Collect the pipes of different sizes available in the shop.
2. Identify the types of material used in the pipes.
3. Draw a figure of the pipes.
4. List the types of pipe and their use.

## Check Your Progress

### A. Explain the following

1. Differentiate between GI and CI pipes.
2. Why are GI pipes preferred over PVC pipes?





3. List the precautions one should take during laying of pipes.
4. List the uses of the GI, CI, asbestos and PVC pipes.

**B. Mark the correct option**

1. Use of steel pipes in the water supply system is preferred due to:
  - (a) low budget
  - (b) non-availability of other pipes
  - (c) pipes can be subjected to very high pressure
  - (d) low diameter pipes
2. The type of pipes suitable for supplying water of higher temperatures up to 120° C is:
  - (a) CPVC
  - (b) UPVC
  - (c) PVC
  - (d) PEX or XLPE
3. Pipes which are used for the removal of rainwater from roofs, soil and waste:
  - (a) AC
  - (b) PVC
  - (c) GI
  - (d) CI

**C. Mention the full-forms of the following terms**

1. GI pipes \_\_\_\_\_
2. AC pipes \_\_\_\_\_
3. UPVC pipes \_\_\_\_\_
4. CI pipes \_\_\_\_\_

